HIGH FARMING AND DISEASE.

A Rural Outbreak of Diphtheria.

BY

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Infectious diseases, particularly scarlet fever and diphtheria, were more than ordinarily prevalent in the Stewartry last year, and I have to chronicle the occurrence of one serious epidemic of diphtheria in the eastern district. This epidemic made a considerable noise in the local newspapers, and an army of volunteers at once stepped into print to explain all about it. Their cocksureness as to the cause and origin of the epidemic might have been of valuable assistance to me, but, unfortunately, it was a case of *tot homines tot sententiae*, and I had to fall back on my own judgment. The first information came to hand in a batch of notifications, dated October 30th, intimating that four members of one family at Cluny Hill Farm were down with diphtheria. I visited the farm, and as far as the information I could gather and my own observations went, it seemed perfectly clear that three of the family had caught infection directly from the first child who had fallen ill. Where did the first case come from? I had little doubt that the child had contracted the disease at the Terregles School. The whole subsequent history of the epidemic confirms me in this belief. The next question must be, How did the school come to be infected? Were there such insanitary conditions at the school as might be reasonably suspected of breeding diphtheria, or was the infection brought to the school by scholars suffering from unrecognised or unrecognisable forms of diphtheria? My opinion at the time, and it is the opinion I still hold, is that there was illness of a diphtheritic nature among the scholars attending the school long before the Cluny Farm cases came to light. I should particularly mention here two suspicious cases at a cothouse on Kirkland Farm close to Cluny where no doctor was called in. This illness may have originated at the school or it may not. The school is built, I understand, on a piece of old garden ground. There is a churchyard at the end of the playground, and just over the playground wall there was a heap of ashpit refuse apparently of long standing and seldom cleared away. The pail privies at the school do not seem to have been very well attended to. I am far from saying that there was no possibility of diphtheria originating at the school from unhealthy emanations given off from the privies or the refuse heap aforesaid, or from the suction into the school of foul ground air, and, in the absence of any other probable source, suspicion might very justly fall on the school. But there were circumstances which seemed to me to point rather to infection having been brought to the school from breeding ground elsewhere. It is noteworthy in reference to this that the first case of diphtheria which occurred in the district was in the month of June at Terreglestown Farm. No school question could possibly arise here, as the patient was the farm overseer. Again, in July two grown-up persons residing close by were attacked, and months later, in November, while the Terregles epidemic was in full blast, a little girl of four at Terreglestown Farm (daughter of overseer), who had not been to school at all, sickened of diphtheria. These considerations, among others, made me refuse to subscribe to the dictum which was loudly voiced at the time, that the school was the head and front of the mischief. Besides, it was my belief that there were conditions at Terreglestown appertaining to the mode of farming the ground which favoured the development of diphtheria. Immense quantities of manure are brought to the farm from the towns of Maxwelltown and Dumfries, and it was the practice to heap up this manure into a huge mass at the roadside near Maxwelltown Station, where it lay ever so long before it was spread on the ground. The cothouses on this farm, where the farm operatives and their families reside, have acquired a notoriety for the amount of infectious trouble that has from time to time broken out in them. Children from there attend the Terregles School, and at the time I was making inquiries as to the outbreak of diphtheria, I was informed by the teacher that several scholars from these cottages had been ill with sore throats just prior to the outbreak. On the 6th of November, a week after the first notified case, a child aged $2\frac{1}{2}$ years, who, of course, had not attended the school, took ill of diphtheria and died. Her mother also was notified on the same day as suffering from diphtheria. The only occupants of the house (one of the Terreglestown Cottages) were father, mother, and child. The father was one of the farm labourers. Another labourer in the next house was, I was informed, or had lately been, suffering from sore throat. In the months of June and July six cases of scarlet fever were notified from these cottages, and about the same time three cases of scarlet fever were notified from the railway cottages at Maxwelltown Station, situated about eighty yards from the manure heap already referred to. Another focus of disease appeared to be at Kirkland Farm close to the school, and at the hamlet of Bowhouses, a bow-shot distant, where nuisances, particularly from choked drains, filth accumulation, and contaminated water were discovered and reported on. All the cases were confined to an area of not much more than one square mile.

The epidemic lasted about a month, from the end of October to the end of November, during which time there were notified in all eighteen cases, whereof six died. On November 20th, while the epidemic was still in progress, the following report, dealing mainly with the causation

of diphtheria, was submitted by me to the District Committee:—

"While it would be unprofitable to discuss the causes of diphtheria in general, about which there is a great conflict of opinion, the question may very reasonably be asked why this particular area round about Terregles should be singled out by the scourge, while other places have been, comparatively speaking, unmolested. It will not do to appeal to such general causes as weather conditions, for these are practically the same all over the county. While they might account—and no doubt the peculiar weather of last autumn does account—for a general tendency to the prevalence of diphtheria and other infectious diseases; still, when one locality is pounced upon to the exclusion of others, it is natural to suppose that there exists in the affected area special local conditions which either favour the development of the germs of the disease, or which, once the disease has become established in one or two places, favour its spread from person to person. I believe that in the present outbreak both these influences have been at work. There are some authorities who believe, or affect to believe, that the occurrence of diphtheria is not dependent on insanitary conditions at all. I need not go into their arguments, which are not to my mind by any means convincing. I believe diphtheria to be a filth-produced disease, depending upon a variety of causes, chief among which are damp, dirty, and over-crowded houses, with mouldy walls and rotten floors, emanations from collections of offensive and putrescent matter in and around dwellings, offensive smells from sewers, and, in fact, any decomposing animal or vegetable refuse which pollutes the air, especially under circumstances where this tainted air has to be habitually inhaled. These, most likely, with the help of special meteorological conditions or other occult influences, either breed the disease directly or induce a habit of body which predisposes to diphtheria. The near relatives of diphtheria are the other dirt diseases—typhoid fever and erysipelas. They are all scions of the great M'Clarty family. Breathe polluted air long enough, and you get diphtheria; drink polluted water sufficiently often, and you get typhoid fever; inoculate yourself persistently with dirt, and you get erysipelas. These diseases, bacteriologists tell us, are caused by certain bacilli or microbes with German or Latin names. But this does not help us much. Given the conditions I have postulated, these foreigners, who are really never very far away, will make their appearance sooner or later. Scarlet fever is said to be a frequent precursor or concomitant of diphtheria. It has been so in this instance—a sharp outbreak of scarlet fever at Lochfoot, with scattered cases here and there throughout the parish of Terregles, having occurred just before the diphtheria epidemic appeared. Many cases of scarlet fever are unrecognisable as such, there being no more indication of the disease than a slight inflammation of the throat. In the area where diphtheria has appeared it is probable that numerous cases of the kind were about, and it is well known that whatever damages or weakens the membrane of the throat makes it easy for the diphtheria poison to effect a lodgment there. I am told that before the diphtheria broke out at Terregles many of the children attending the school were affected with sore throats. These throats may have been either scariatinal in their nature, or they may have been diphtheritic, for diphtheria may show all gradations from a mere sore throat up to the true membranous and fatal form. It is easy, therefore, to see how one or two cases of an apparently innocent disease occurring at a school may bring disaster upon a whole neighbourhood. I do not say that the diphtheria outbreak at Terregles originated at the school, but I have no doubt of this—that it was through the instrumentality of the school that the disease has been so widely spread."

The point of special interest about the epidemic is its seeming manurial origin and its connection with a farm kept in high fertility by the use of enormous quantities of byre and stable dung collected from the adjacent towns. There is probably more injury to health arising from manure and organic refuse of all kinds in country districts than is generally supposed. Diphtheria is essentially a rural disease,* and the country differs from the town in this important respect, that whereas manure and other garbage is got rid of in towns as quickly as possible, in the country it is usually left recklessly to lie about dwellings in festering heaps for months before it is applied to the soil. The agricultural industry, although it is perhaps the healthiest of all, has yet the little drawback, especially where

* In Scotland, prior to 1881, the proportion of deaths from diphtheria to deaths from all specified causes shows a marked preponderance in rural over urban districts. After that date the difference in this respect between town and country becomes gradually less, and for the last ten years or so, not only do the town districts as a whole approximate or surpass the rural districts, but the principal towns surpass them greatly. Although an appeal to relative mortality rates no longer supports the proposition that diphtheria at the present day is any more distinctively rural than urban in its incidence, still there are many considerations which point to the country being peculiarly the breeding place of a disease which appears to me to require little more for its development than what comes from a more or less intimate association with masses of putrefying refuse and old-standing accumulations of dung and filth; nor is it surprising that the towns, and the principal towns especially, are beginning to suffer from diphtheria more severely than the country. If they turn the neighbouring meadows into sewage farms; if they find convenient sepulture for mountains of manure in suburban market gardens; above all, if they cast forth their offal, street sweepings, and other refuse to be left unburied without their gates or plastered over the nearest dairy farm, then assuredly there must be a day of reckoning. They become each the centre of a circle where all those conditions from which rural diphtheria springs are present in aggravated form. The towns sow the wind in the country around them, and naturally reap the whirlwind.

high farming and heavy manuring prevail, of encouraging, if not scarlet fever and some other infectious troubles, most certainly obscure forms of throat affection, which often culminate in diphtheria. I may state that I hold strong views as to the danger of accumulations of town refuse. It may be taken that they are never free from disease germs. But even granted that at first the only bacterial tenants are the thousand and one kinds of "benign" microbes that are omnipresent and ubiquitous, where have these organisms so favourable an opportunity as in warm, moist, putrescent garbage to multiply and develop into the full-blown forms which produce disease? I hold that heaps of decomposing vegetable and animal refuse of all kinds particularly favour the development of diphtheria germs; and, although this is not the place to enter into a long disquisition on a subject as to which very little is known for certain, and all is more or less plausible conjecture, I may at least state that over and over again I have observed, in investigating cases of diphtheria, a chain of circumstances which leads me to suppose that there is an embryonic form of the disease, particularly in adults, which never gets further in its development and manifestations than what appears to be a simple sore throat, that persons engaged in agricultural operations—those who have much to do with old standing manure—are subject to this form of throat affection, and that when they infect their families, as I think they sometimes do, it appears in the children as typical diphtheria.

THE BROOK HOSPITAL.

THE practical application of well-known principles in hospital construction has almost reached a perfection beyond criticism in the Brook Hospital, Shooter's Hill. This hospital is one of three new permanent hospitals, and is the first of the three to be completed.

Site.—The site is nine miles from Charing Cross, and there is little doubt that the majority of patients received will have less than an hour's journey—a fever patient must be extremely ill not to be transferred without risk in a comfortable ambulance this short distance. The site is 29 acres in area, 21 acres of which are at present used, thus leaving 8 acres of surplus land for temporary wards during epidemics.

Accommodation.—The normal number of beds will be 488, viz., 24 isolation beds, 112 for enteric and diphtheria, 352 for scarlet fever—hence, with regard to the latter disease, for which there still exists inadequate accommodation, reckoning an average period of seven weeks per bed, the hospital may take some 2,500 cases yearly. The staff of the hospital will consist of 325 persons.

General Plan.—The general plan is based upon the pavilion system. There are 12 main ward pavilions—8 for scarlet, 4 for enteric and diphtheria, each two storeys high, raised from the ground on arches resting on concrete. There is ample space between each pavilion, so that the one will not shadow the other. The administrative buildings are large and spacious, entirely separate from the wards. The nurses and staff generally, when off duty, will thus be free from the ordinary hospital surroundings.

The Ward Pavilions.—As these are all built on a general plan, one description will suffice for all. Each scarlet fever ward contains 20 beds. The height of the ward is 13 ft., the length 120 ft., the width 26 ft., and the following are the respective spaces per bed:—

	Scarlet Fever.	Enteric and Diphtheria.
Linear wall space ...	12 ft.	15 ft.
Floor area	156 ft.	195 ft.
Cubic space	2,028 ft.	2,535 ft.

On each floor of each ward pavilion for scarlet fever are contained, besides the main ward, one separation ward, a bath room, a duty room, a linen store, larder, and w.c. turrets. With regard to the latter, instead of the usual plan of placing them at the end of the wards, the w.c. turret is placed on the east side of each ward and separated therefrom by a lobby having windows on both sides. This innovation in ward construction strikes the writer as particularly advantageous, for the distal end of the ward, which has a southern aspect, is kept free from all impediments to light and air, and is provided with a verandah leading to an escape staircase, the staircase being external to the building. It would certainly have also been useful to have provided a roomy lift, so that bad cases might easily be moved up or down on the beds they lie upon. The ventilation is partly by open ventilating fire-places made by Messrs. Hendry and Pattison, partly by valvular gratings in the external walls under each bed at the floor line, and mainly by the windows, the ordinary double-hung sashes of which are supplemented by hopper-hung fan-lights, besides which there are special vertical shafts. Each shaft is 14 inches square internally, and lined with salt-glazed bricks, with rounded internal angles. There are three of these shafts to each ward, and an upward current is generated in each shaft by means of a copper steam coil. Two connections with each shaft are made in each ward—one at the floor line, and one at the ceiling line—and valvular gratings are provided in each opening, so regulated by hand-gearing that when the upper one is open the lower one is closed, and *vice versâ*. The warming is effected by the ventilating grates previously mentioned, and by low pressure hot-water apparatus. The air passes to the stoves by a short channel, and after being warmed, streams into the ward. The hot-water warming apparatus consists of radiators composed of copper spiral coils cased in iron. These are placed against the external walls under the